

What is claimed is:

1. A compound semiconductor FET comprising:

an AlN layer provided on a substrate;

an n-type delta doped III-N layer provided on the AlN layer;

5 a plurality of III-N layers provided on the n-type delta doped III-N layer;

a source electrode;

a gate electrode; and

a drain electrode.

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2. The compound semiconductor FET according to claim 1, wherein the n-type delta doped III-N layer is an n-type delta doped GaN layer,

wherein the plurality of III-N layers comprise a GaN layer and an AlGaN layer formed on the GaN layer, and

15 wherein the source electrode, the gate electrode, and the drain electrode are provided on the AlGaN layer.

3. The compound semiconductor FET according to claim 1, further comprising an insulating layer on the AlGaN layer, wherein the n-type delta doped III-N layer is an n-type delta doped GaN layer,

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wherein the plurality of III-N layers comprise a GaN layer and an AlGaN layer formed on the GaN layer,

wherein the source electrode and the drain electrode are provided on the AlGaN layer, and

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wherein the gate electrode is provided on the insulating layer.

4. The compound semiconductor FET according to claim 1, wherein dopant concentration of the n-type delta doped III-N layer is set so as to reduce discontinuity of an electric field at an interface between the AlN layer and the III-N layer.

5. The compound semiconductor FET according to Claim 1, wherein material of the substrate is sapphire,

wherein each of the semiconductor layers is formed of a semiconductor having a C-plane Ga-surface, and

wherein sheet doping concentration of the n-type delta doped III-N layer is within a range of $1 \times 10^{13} \text{ cm}^{-2}$ to $2 \times 10^{13} \text{ cm}^{-2}$.

6. The compound semiconductor FET according to Claim 1, wherein material of the substrate is SiC,

wherein each of the semiconductor layers is formed of a C-plane Ga-surface oriented semiconductor, and

wherein sheet doping concentration of the n-type delta doped III-N layer is within a range of $5 \times 10^{12} \text{ cm}^{-2}$ to $1.5 \times 10^{13} \text{ cm}^{-2}$.

7. An electronic circuit provided with the compound semiconductor FET as defined in claim 1.